First Light from Jupiter: Initial Atmospheric and Satellite Results from the Near Infrared Mapping Spectrometer.

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During late June 1996, the *Galileo* spacecraft obtained its first remote-sensing measurements within the Jovian system, and the Near Infrared Mapping Spectrometer (NIMS) performed spectroscopic and spectral mapping measurements of Jupiter's atmosphere and the surfaces of Ganymede and Callisto. The NIMS instrument represents a marriage of spectroscopic and imaging capabilities, the combination of which provides a powerful remote-sensing tool. A large number of molecules and minerals exhibit diagnostic spectral signatures in the NIMS range, thereby providing unique information for studying diverse phenomena and targets, including both atmospheres and solid surfaces.

Our atmospheric measurements concentrated on two features: a 5 μm hot spot and the Great Red Spot. Hot spots, within which one can probe the deep troposphere (down to the 8 bar region) and determine abundances of trace species (e.g. H_2O, NH_3, GeH_4, PH_3), have long been of interest in NIMS investigations, and this interest is heightened by the entry of the Galileo probe into such a region. Our preliminary analyses indicate less ammonia absorption within the observed hot spot, and water abundances consistent with the Probe measurements. For the Great Red Spot, we used the vertical sounding capability of absorption bands of differing strengths to determine the altitude structure of the clouds and the corresponding motions.

Our satellite measurements consist of global spectral maps of Ganymede (100 km spatial resolution) and Callisto (650 km), and higher-spatial-resolution spectral images of selected targets on Ganymede. Derived compositional maps will be useful for studying the evolution and history of the satellite surfaces. Both Ganymede and Callisto show the presence of water and hydrated minerals in varying concentrations over their surfaces. A new absorption feature was found at 4.25 μm, which is stronger in Callisto's spectrum. Candidate materials producing this feature include hydrates, hydroxides, and carbon dioxide (frost or clathrate).

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